IN THE SPECIFICATION:

At page 2, lines 28-32 to page 3, lines 1-3 of the original specification, please delete the paragraph therein. (see marked up page 2 attached)

Please delete pages 4, 5 and paragraph at page 6, lines 1-7 of the original specification. (see marked up pages 4,5, and 6 attached)

At page 6, lines 26-29 through page 7, lines 1-6, please delete the current paragraph and replace it with the following amended paragraph:

B1

--Particularly in fluorescence microscopy, to which the present example pertains, the illumination light proceeding from a light source 6 is reflected through an excitation filter 7 into the dichroic beam splitter 8 and impinges on the specimen 1. The fluorescent light which now proceeds from the specimen 1 radiates in the entire solid angle and is accordingly detected by the microscope objective 2 as well as by objective 3. After traversing the objective 3, the fluorescent light is parallel and impinges on the mirror 5 by which it is reflected back precisely in the focus of the microscope objective 2 and is collected by the microscope objective 2; after passing through the dichroic beam splitter 8, the blocking filter 10 and the eyepiece 11, it is now available for observation (or other evaluation).--

At page 9, line 4, of the original specification, please insert the following paragraphs which were moved from pages 2-6.

B2

--It is possible, and also lies within the scope of this invention, to arrange diaphragms, Wollaston prisms, polarizers or analyzers and/or other subassemblies for optical contrasting in the beam path in a known manner. Any optical contrasting methods by which artificial contrasting can be achieved without harmful intervention in the preparation can be used, i.e., darkfield methods, phase contrast methods in which phase shifts are converted to brightness values, polarization contrast methods for observing birefringent specimens, generation of a differential interference contrast (DIC) and, above all, fluorescence contrasting.

This last embodiment can therefore be applied advantageously above all in fluorescence microscopy because the fluorescent light emitted by the specimen has a very low intensity in comparison to the exciting light. In the suggested manner, the fluorescent light that is not directly detected by the microscope objective can be detected by means of the second objective in the reflecting device and is reflected back again into the focus of the microscope objective. It is collected in the latter and used as an additional basis for detection.

B2 Cont

The invention is further directed to a laser scanning microscope in which a light-transmitting specimen is again positioned between two objectives with at least approximately identical optical characteristics and a mirror is arranged following at least one objective, wherein this mirror is constructed as a phase-conjugating or adaptive mirror by which the wavefront of the reflected light is made to coincide with the wavefront of the transmitted light and the light is reflected back into itself exactly with respect to direction and phase front.

In this way, the advantages of the arrangement according to the invention can also be utilized particularly for confocal laser scanning microscopy. Optical scanning in which a light point deflected by oscillating mirrors or rotating polygon prism mirrors sweeps over the object has proven successful in this connection. Pinhole diaphragms conjugated in the illumination and observation beam path ensure that only the light from the respective adjusted focal plane reaches the detector. In this way, spatially resolved and time-resolved data can be obtained in a known manner, but, thanks to the construction of the arrangement according to the invention, with substantially higher efficiency than in the known prior art.

As was already mentioned, the mirror surface of the phase-conjugating mirror is constructed in such a way that the wavefront of a plane wave is changed after being reflected on the mirror surface such that distortions are corrected and the reflected light is reflected back into itself exactly.

On the other hand, the adaptive mirror which can be used alternatively is provided with a deformable mirror surface arranged on a diaphragm, wherein a plurality of individual electrodes are located opposite the diaphragm on its side remote of the mirror surface and electric voltage is applied to the diaphragm on the one hand and to the electrodes on the other

hand; the desired deformation of the diaphragm is triggered by changing the voltages, and accordingly the electrostatic forces, acting between the diaphragm and electrodes.

In this regard, control is carried out depending on the image quality that has been achieved and, as the result of corresponding deformation of the mirror surfaces, causes the light reflected by the mirror to be reflected back exactly in itself and image errors and alignment inaccuracies are compensated.

The adaptive mirror can also be constructed in such a way that the diaphragm is connected, on its side remote of the mirror surface, to a plurality of individual piezoelectric drives and the deformation of the diaphragm is brought about by controlling the piezoelectric drives in different ways.

The electrodes and/or the piezoelectric drives with which the deformable mirror surfaces are coupled can communicate with a detection device via an evaluating unit for a beam component which is coupled out of the observation beam path. The beam component is assessed according to intensity, for example, wherein an intensity signal is obtained and taken as basis for determining an actuating signal for deformation of the mirror diaphragm.

This further development of the inventive idea is applicable in fluorescence microscopy in a particularly preferred manner in that the intensity of the fluorescent radiation proceeding from the specimen is assessed.

In other constructional variants of the invention relating to field-transmitting and scanning systems, the reflecting device can be constructed as a brightfield arrangement having two objectives which together form an optical system with an infinite output intersection length.

Further, it is advantageous, particularly with respect to applications for microphotometry, when the reflecting device can be swiveled out of the microscope beam path and a photomultiplier can be swiveled in in its place for transmitted-light detection. In this way, no cumbersome modification or adjustments are required for changing to photometric measurements.

Another construction of the field-transmitting and laser scanning microscope consists in that at least one of the objectives is connected with an adjusting device for displacement in axial and/or radial direction and the adjustment is carried out depending on the achieved image quality or intensity and/or contrast. This adjusting possibility is advantageous particularly for adjusting the optical resonator mentioned above. In this case, piezomechanical drive elements above all have proven successful as actuating drives.

B2 end

However, this possibility of axial and/or radial adjustment serves not only for the adjustment of the optical resonator, but also opens the door to more or less novel contrasting methods, especially when adjustment accuracies in the submicrometer range, preferably in the range of several hundred nm, are realized. Such accuracy can readily be achieved with piezo actuating elements, and phase interference and differential interference contrasting methods can be further developed in this way in terms of their efficiency.--